

year, crossed over the Rocky Mountain region on the 25th. It moved thence southeastward to Texas, where it was central on the morning of the 26th. Its path was thence directly northeastward over the Central States and the Lake districts, reaching Illinois by the morning of the 27th. It was accompanied by rain, turning to snow, and shifting gales, and was followed by a well-marked cold wave. Cold-wave warnings were sent out well in advance of the fall in temperature, and all sections of this district had thirty-six hours notice of the cold wave. Advisory messages were sent to all open ports on Lake Michigan that maintain winter navigation, cautioning all vessels to remain in port. In consequence no wrecks resulted. Telephone and telegraph wires suffered much damage from the storm in this district, and it was several days before the telegraphic service was again satisfactory. The snowfall was heavy in the middle and upper Mississippi valleys, which resulted in great inconvenience and delay to transportation interests.—*H. J. Cox, Professor and District Forecaster.*

ROCKY MOUNTAIN FORECAST DISTRICT.

On the morning of the 25th warnings were sent to points in Wyoming and northeastern Colorado for the cold wave that overspread the eastern slope of the Continental Divide. The following information was given transportation companies: "Cold wave to-night; temperature will reach zero or lower in Wyoming and 10°, or lower, in northeastern Colorado. High northerly winds with snow."

Apart from the low temperature that prevailed from the 26th to the 28th over the greater part of the district, the weather conditions were generally fine during the month.—*F. H. Brandenburg, District Forecaster.*

SOUTH PACIFIC FORECAST DISTRICT.

The month as a whole was one of deficient rainfall in California. At San Francisco hardly one-third of the normal rain fell. In the southern part of the State cloudy weather prevailed about the beginning of the month, and rain fell from a disturbance that apparently traversed the northern portion of Lower California, northwestern portion of Mexico, and the Valley of the Colorado. During this period no rain fell in northern California. A marked winter storm appeared on the northern coast on the night of December 8, and gave general rain in northern and central California. The disturbance passed rapidly eastward, as indeed did nearly all of the northern disturbances during the month. Another disturbance appeared on December 11, on the northern coast, causing, as before, rains only in the northern part of the State. An area of high pressure over the intermountain section and extending well to the west was the predominant feature of the pressure distribution during the month. A marked storm appeared off the Washington coast on December 22. By December 23 the disturbance was well marked over the northern half of the coast. On December 24 there appeared off the coast of southern Oregon and northern California a depression which subsequently traversed the entire country, causing heavy rains in northern California and high winds along the coast, in the valleys, and in the mountains. Its passage over Nevada was followed by a cold wave in that State on Christmas morning. Frost warnings were issued for California. It is also interesting to note that heavy frost was reported at Mount Tamalpais, although the wind blew from 45 to 60 miles an hour. Another storm appeared on the Washington coast on the morning of December 28, and moved slowly southward, causing rain by the end of the month as far south as San Diego.

It may be noted that in the San Francisco Bay section dur-

ing the month of December an unusually large number of earthquakes occurred.—*Alexander G. McAdie, Professor and District Forecaster.*

NORTH PACIFIC FORECAST DISTRICT.

December in the North Pacific States was not so stormy as the preceding month, although several gales occurred the most severe of which was the one that swept the district on the 28th and 29th, at which time a maximum wind velocity of 76 miles from the south was recorded at North Head. Timely warnings were issued for this, as well as for all the other storms and they were undoubtedly of great benefit to shipping as the casualties reported were all of a minor character.

No cold-wave warnings were issued during the month, and the only zero weather reported lasted but an hour or two and occurred in southeastern Idaho on the morning of the 26th.—*Edward A. Beals, District Forecaster.*

RIVERS AND FLOODS.

There were no floods during the month, although the heavy rains of the last ten days of the month over the Willamette and Sacramento watersheds started a rise that gave promise of danger-line stages over their lower portions during the first few days of the succeeding month. Warnings to this effect were issued on the 30th. About the same time substantial rains over the Ohio Valley caused a general rise in the Ohio River, and navigation was resumed between the 27th and 29th. On the upper Tennessee navigation was possible at intervals.

The ice situation during the month may be summarized as follows: Red River of the North at Moorhead, Minn., increase in thickness from seven to eighteen inches. Missouri River, open throughout the month from Sioux City southward; closed at Pierre on the 12th. Mississippi River, practically closed during the latter half of the month above Davenport; at the end of the month there were twelve inches of ice at St. Paul and six inches at La Crosse. There was much heavy floating ice from below Davenport to the mouth of the Ohio River, necessitating a suspension of navigation from the 16th to the 22d, inclusive. The Ohio River was not frozen over, but there was considerable floating ice, with an occasional gorge between Portsmouth and Cincinnati.

The rivers of New England were generally frozen, the Connecticut at Hartford having closed on the 10th. The Hudson and its tributaries were also frozen, and at the close of the month there were from nine to twelve inches of ice at Albany. The Susquehanna closed earlier than usual, and the entire river above Harrisburg was frozen over by the 12th. General rains on the 27th caused a thaw and a break-up, and the ice passed down the river doing some damage. A gorge that was formed in Cecil County, Md., remained intact at the end of the month, and proved a source of serious apprehension to all who remember the great gorge of January, 1904. Warnings of the thaw and break-up were issued on the 27th, and they were the means of saving considerable property.

The highest and lowest water, mean stage, and monthly range at 257 river stations are given in Table VII. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, Professor.*